WE CLAIM:

1. In a computer system, a method of processing video images in a video sequence, the method comprising:

processing macroblocks in a current image in the video sequence, wherein the macroblocks are 4:1:1 format macroblocks, each macroblock comprising four 8x8 luminance blocks and four 4x8 chrominance blocks;

wherein the processing macroblocks comprises intra-frame and inter-frame processing.

2. The method of claim 1 wherein the current image is an interlaced image.

3. The method of claim 1 wherein the current image is a bi-directionally predicted image.

4. The method of claim 1 wherein at least one macroblock is a field-coded interlaced macroblock having a top field and a bottom field, each field comprising two luminance blocks and two chrominance blocks.

5. The method of claim 1 wherein at least one macroblock is a frame-coded macroblock.

6. A computer readable medium storing computer executable instructions for causing the computer system to perform the method of claim 1 during video encoding.

7. A computer readable medium storing computer executable instructions for causing the computer system to perform the method of claim 1 during video decoding.

8. A computerized method of encoding video images in a video sequence, wherein the video images comprise interlaced video images partitioned into macroblocks, the method comprising:

classifying a macroblock in an interlaced video image as a field-coded macroblock, wherein the field-coded macroblock comprises a top field and a bottom field;

encoding the top field using a coding mode selected from a group comprising intra-coding mode and inter-coding mode; and

encoding the bottom field using a coding mode selected from the group comprising intra-coding mode and inter-coding mode;

wherein the coding mode used for encoding the top field and the coding mode used for encoding the bottom field are selected independently of one another.

9. A computerized method of encoding video images in a video sequence, wherein the video images comprise interlaced video images partitioned into macroblocks, the method comprising:

sending encoded blocks in field order for a first field in a field-coded macroblock; and

sending encoded blocks in field order for a second field in the field-coded macroblock;

wherein the acts of sending encoded blocks in field order facilitate encoding the first field and the second field independently from one another.

10. The method of claim 9 wherein the first field is an intra-coded field and the second field is an inter-coded field.

11. The method of claim 9 further comprising, prior to the sending acts, encoding blocks in the first field using DC/AC prediction, wherein the first field is an intra-coded field.

12. The method of claim 9 wherein the first field is an intra-coded field comprising two luminance blocks and two chrominance blocks and the second field is an inter-coded field comprising two luminance blocks and two chrominance blocks.

13. The method of claim 12 wherein the luminance blocks are 8x8 luminance blocks and the chrominance blocks are 4x8 chrominance blocks.

14. The method of claim 9 wherein the field-coded macroblock is a 4:1:1 macroblock.

15. A computerized method of decoding video images in a video sequence, wherein the video images comprise interlaced video images partitioned into macroblocks, the method comprising:

receiving encoded blocks in field order for a first encoded field in a field-coded macroblock;

receiving encoded blocks in field order for a second encoded field in the field-coded macroblock; and

decoding the first encoded field and the second encoded field;

wherein the receiving encoded blocks in field order for the first encoded field and the receiving encoded blocks in field order for the second encoded field facilitate decoding the first encoded field and the second encoded field independently from one another.

16. The method of claim 15 wherein the first encoded field is an intra-coded field and the second encoded field is an inter-coded field.

17. The method of claim 15 further comprising decoding blocks in the first encoded field using DC/AC prediction, wherein the first encoded field is an intra-coded field.

18. The method of claim 15 wherein the first encoded field is an intra-coded field comprising two luminance blocks and two chrominance blocks and the second encoded field is an inter-coded field comprising two luminance blocks and two chrominance blocks.

19. The method of claim 18 wherein the luminance blocks are 8x8 luminance blocks and the chrominance blocks are 4x8 chrominance blocks.

20. The method of claim 15 wherein the field-coded macroblock is a 4:1:1 macroblock.

21. A method of decoding a field-coded macroblock comprising an intra-coded field and a second field, the method comprising:

finding a DC differential for a current block in the intra-coded field;

finding a DC predictor for the current block; and

obtaining a DC value for the current block, wherein the obtaining comprises adding the DC predictor to the DC differential;

wherein the intra-coded field is decoded independently from the second field.

22. A method of decoding a field-coded macroblock comprising an intra-coded field and a second field, the method comprising:

finding a DC differential for a current block in the intra-coded field;

selecting a DC predictor from a group of candidate DC predictors, wherein the group of candidate DC predictors comprises DC values from blocks adjacent to the current block, wherein a candidate DC predictor is a missing candidate DC predictor if the candidate DC predictor is not intra-coded, and wherein the selected DC predictor is a non-missing candidate DC predictor; and

obtaining a DC value for the current block, wherein the obtaining comprises adding the selected DC predictor to the DC differential.

23. The method of claim 22 wherein the selected DC predictor comprises a DC value from a previously decoded block.

24. The method of claim 22 wherein a candidate DC predictor is a missing candidate DC predictor if the candidate DC predictor is outside a picture boundary.

25. The method of claim 22 wherein the blocks adjacent to the current block are the top, top-left and left adjacent blocks.

26. A computerized method of encoding an interlaced macroblock, the method comprising:

performing DC prediction for a current block in the interlaced macroblock, wherein the DC prediction comprises adding a selected DC predictor for the current block to a DC differential; and

selectively enabling AC prediction for blocks in the macroblock.

27. The method of claim 26 wherein the AC prediction is enabled, and wherein AC coefficients are selected for differential coding based on the selected DC predictor for the current block.

28. The method of claim 27 wherein, if no DC predictor is used, no AC coefficients are selected for differential coding.

29. The method of claim 26 further comprising, in a bit stream, signaling whether AC prediction is enabled for blocks in the macroblock.

30. The method of claim 29 wherein the macroblock is a frame macroblock, and wherein the signaling comprises sending a one-bit flag indicating whether AC prediction is performed for all blocks in the frame macroblock.

31. The method of claim 29 wherein the interlaced macroblock is a field macroblock, and wherein the signaling comprises sending a one-bit flag indicating whether AC prediction is performed for blocks in a first field in the field macroblock.

32. The method of claim 31 wherein the signaling further comprises sending a one-bit flag indicating whether AC prediction is performed for blocks in a second field in the field macroblock.

33. A computerized method of encoding a macroblock in an interlaced video image, wherein the macroblock comprises a first field and second field, and wherein the macroblock is predicted at least in part from other images in the sequence, the method comprising:

finding a motion vector for the first field, wherein the first field is an inter-coded field; and

encoding the macroblock using the motion vector for the first field;

wherein the second field is an intra-coded field.

34. A computerized method of encoding a macroblock in an interlaced video image, wherein the macroblock comprises a first field and second field, and wherein the macroblock is predicted at least in part from other images in video image sequence, the method comprising:

finding a motion vector predictor for predicting a motion vector for the first field from among a group of candidate predictors, wherein the candidate predictors are motion vectors for neighboring macroblocks, and wherein the motion vector predictor is a motion vector for one corresponding field in a neighboring field-coded macroblock comprising two fields;

calculating a motion vector for the first field using the motion vector predictor; and

encoding the macroblock using the calculated motion vector.

35. The method of claim 34 wherein the first field is a top field, and wherein the one corresponding field in the neighboring field-coded macroblock is a top field.

36. The method of claim 34 wherein the first field is a bottom field, and wherein the one corresponding field is a bottom field.

37. A computerized method of processing a macroblock in an interlaced video image, wherein the macroblock is predicted at least in part from other images in a video image sequence, the method comprising:

finding a luminance motion vector for the macroblock; and

deriving a chrominance motion vector for the macroblock from the luminance motion vector;

wherein the macroblock is a 4:1:1 macroblock.

38. The method of claim 37 wherein the deriving comprises scaling down the luminance motion vector by a factor of four.

39. The method of claim 38 further comprising rounding the chrominance motion vector to quarter-pixel resolution.

40. The method of claim 37 further comprising:

determining whether the chrominance motion vector references an out-of-frame region in a reference frame; and

based on the determining, performing a pull-back of the chrominance motion vector.

41. A computer readable medium storing computer executable instructions for causing the computer system to perform the method of claim 37 during video encoding.

42. A computer readable medium storing computer executable instructions for causing the computer system to perform the method of claim 37 during video decoding.

43. A computerized method of decoding a current macroblock in an interlaced video image, wherein the macroblock is predicted at least in part from other images in a video image sequence, the method comprising:

decoding a motion vector for the current macroblock, wherein the current macroblock is an interlaced macroblock; and

obtaining a prediction macroblock for the current macroblock using the decoded motion vector for the current macroblock;

wherein the obtaining comprises performing bi-cubic interpolation to obtain sub-pixel displacement for the current macroblock.

44. The method of claim 43 wherein the current macroblock is a 4:1:1 macroblock.

45. The method of claim 43 wherein the current macroblock is a frame-coded macroblock having one associated motion vector.

46. The method of claim 43 wherein the current macroblock is a field-coded macroblock having a first field and a second field.

47. In a computer system, a method of processing a bi-directionally predicted video image in a video sequence, the method comprising:

processing a macroblock in the bi-directionally predicted video image, wherein the macroblock is a 4:1:1 format macroblock comprising four 8x8 luminance blocks and four 4x8 chrominance blocks;

wherein the bi-directionally predicted video image has plural references in the video sequence.

48. The method of claim 47 wherein the bi-directionally predicted video image is an interlaced image.

49. The method of claim 48 wherein the macroblock is a frame-coded macroblock having up to two associated motion vectors.

50. The method of claim 48 wherein the macroblock is a field-coded macroblock having up to four associated motion vectors.

51. The method of claim 48 wherein the macroblock is a direct mode macroblock.

52. The method of claim 51 wherein the direct mode macroblock is classified as a frame-type macroblock.

53. The method of claim 51 wherein the direct mode macroblock is classified as a field-type macroblock.

54. A computer system comprising:

means for partitioning a current image in a video sequence into 4:1:1 format macroblocks, each macroblock comprising four 8x8 luminance blocks and four 4x8 chrominance blocks; and

means for processing the macroblocks;

wherein the processing macroblocks comprises intra-frame and inter-frame processing.

55. The computer system of claim 54 wherein the processing is performed during video encoding.

56. The computer system of claim 54 wherein the processing is performed during video decoding.

57. A computer system comprising:

means for encoding interlaced video images in a video sequence, wherein the interlaced video images comprise macroblocks, and wherein the macroblocks comprise blocks;

means for sending encoded blocks in field order for a first field in a macroblock; and

means for sending encoded blocks in field order for a second field in the macroblock;

wherein the means for sending encoded blocks in field order facilitate encoding the first field and the second field independently from one another.

58. A computer system comprising:

means for receiving encoded blocks in field order for a first encoded field in a field-coded macroblock;

means for receiving encoded blocks in field order for a second encoded field in the field-coded macroblock; and

means for decoding the first encoded field and the second encoded field independently from one another.

59. A computer system comprising:

means for finding a motion vector predictor for a first field in an interlaced macroblock from among a group of candidate predictors, wherein the candidate predictors are motion vectors for neighboring macroblocks, and wherein the motion vector predictor is a motion vector for one corresponding field in a neighboring field-coded macroblock comprising two fields;

means for calculating a motion vector for the first field using the motion vector predictor; and

means for encoding the macroblock using the calculated motion vector.